# Different outcome definitions

## Ischemic stroke

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **LaLiberte 2014** | (ICD9) | 433  434  435  437 | Occlusion and stenosis of basilar artery with/without cerebral infarction  Occlusion of cerebral arteries  Transient cerebral ischemia  Other generalized ischemic cerebrovascular disease |
| **Abraham 2015** | (ICD9) | 433.x1  434.x1  436 | Occlusion and stenosis of basilar artery with/without cerebral infarction or occlusion and stenosis of carotid artery with cerebral infarction  Cerebral thrombosis with cerebral infarction or cerebral embolism with cerebral infarction  Acute but ill-defined cerebrovascular disease |
| **Coleman 2016** | (ICD10) | I63 (433) | Cerebral infarction |
| **Bouillon 2015** | (ICD10) | I63 (433) | Cerebral infarction |
| **Maura 2015** | (ICD10) | I63 (433) | Cerebral infarction except code i63.6 (cerebral infarction due to cerebral venous thrombosis, no pyogenic) |
| **Larsen 2016** | (ICD10) | I63  I64 | Cerebral infarction  Embolism of unspecified occlusion in different areas |
| **Yao 2016** | (ICD9) | 433.x1  434.x1  436 | Occlusion and stenosis of basilar artery with/without cerebral infarction  Occlusion and stenosis of carotid artery with cerebral infarction cerebral thrombosis with cerebral infarction  Cerebral embolism with cerebral infarction acute but ill-defined cerebrovascular disease |
| **Staerk 2016** | (ICD10) | Not reported | Cerebral infarction |
| **Francis 2015** | (ICD9) | 433.x1  434.x1  436 | Occlusion and stenosis of precerebral arteries  Occlusion of cerebral arteries  Acute but ill-defined cerebrovascular disease |
| **Tsadok 2016** | (ICD10) | G45.0 (435.x)  G45.1 (435.8)  G45.2  G45.3  G45.8 (435.x)  G45.9 (435.9)  H34.1 (362.31)  I63 (435)  I64 (436) | Vertebrobasilar artery syndrome  Carotid artery syndrome (hemispheric)  Multiple and bilateral precerebral artery syndromes  Amaurosis fugax  Other transient cerebral ischaemic attacks and related syndromes  Transient cerebral ischaemic attack, unspecified (Spasm of cerebral artery, Transient cerebral ischaemia NOS)  Central retinal artery occlusion  Cerebral infarction  Stroke, not specified as haemorrhage or infarction |
| **Lauffenburger 2015** | (ICD9) | 433.01/11/21/31/81/91  434.0/01/1/10/11/9/90/91  436 | Occlusion and stenosis of basilar artery with/without cerebral infarction  Occlusion and stenosis of carotid artery with cerebral infarction cerebral thrombosis with cerebral infarction  Cerebral embolism with cerebral infarction acute but ill-defined cerebrovascular disease |
| **Alonso 2014** | (ICD9) | 433  434  435  436  437  438 | Occlusion and stenosis of basilar artery with/without cerebral infarction  Occlusion of cerebral arteries  Transient cerebral ischemia  Acute, but ill-defined, cerebrovascular disease  Other generalized ischemic cerebrovascular disease  Late effects of cerebrovascular disease |
| **Larsen 2014** | (ICD10) | I63 (433)  I64.9 | Cerebral infarction  ?? |
| **Graham 2014** | (ICD9) | 433.01/11/21/31/81/91  434.0/01/1/11/9/91  436 | Occlusion and stenosis of precerebral arteries  Occlusion of cerebral arteries  Acute but ill-defined cerebrovascular disease |
| **Larsen 2014** | (ICD10) | I63 (433)  I64.9 | Cerebral infarction  ?? |
| **Pallisgaard 2015** | (ICD10) | I63(433.xx)  I64  DG458  DG459 | Cerebral infarction due to trhombosis  Stroke, not specified as haemorrhage or infarction  ??  ?? |
| **Larsen 2013** | (ICD10) | I63 (433)  I64.9 | Cerebral infarction  ?? |
| **Seeger 2015** | (ICD9) | 431.x  433.x1  434.x1  436.x  435.xx | Intracerebral hemorrhage (ICH)  Occlusion and stenosis of precerebral arteries with cerebral infarction  Occlusion and stenosis of cerebral arteries with cerebral infarction  Acute, but illdefined cerebrovascular events  Transient cerebral ischemia |
| **Chan 2016** | (ICD9) | 433  434  436  852  853 | Occlusion and stenosis of basilar artery with/without cerebral infarction  Occlusion of cerebral arteries  Acute, but illdefined, cerebrovascular disease  Subarachnoid subdural and extradural hemorrhage following injury  Other and unspecified intracranial hemorrhage following injury |
| **Villines 2015** | (ICD9) | 433.xx  434.xx  436.0 | Occlusion and stenosis of precerebral arteries with cerebral infarction  Occlusion of cerebral arteries  Acute, but illdefined, cerebrovascular disease |
| **Tsadok 2015** | (ICD9) (ICD10) | 362.3  434  435  436  G45.0  G45.1  G45.2  G45.3  G45.8  G45.9  H34.1  I63  I64 | Retinal vascular occlusion  Occlusion of cerebral arteries  Transient cerebral ischemia  Acute, but illdefined, cerebrovascular disease  Vertebrobasilar artery syndrome  Carotid artery syndrome (hemispheric)  Multiple and bilateral precerebral artery syndromes  Amaurosis fugax  Other transient cerebral ischaemic attacks and related syndromes  Transient cerebral ischaemic attack, unspecified  Central retinal artery occlusion  Cerebral infarction  Stroke, not specified as haemorrhage or infarction |
| **Pallisgaard 2016** | (ICD10) | I60  I61  I62  I63  I64 | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic extradural haemorrhage  Cerebral infarction  Stroke, not specified as haemorrhage or infarction |
| **Sorenson 2013** | (ICD10) | I63(433x)  I64  G458(435x)  G459(435x)  I74(444xx) | Cerebral infarction  Stroke, not specified as haemorrhage or infarction  Other transient cerebral ischaemic attacks and related syndromes  Transient cerebral ischaemic attack, unspecified  Arterial embolism and thrombosis |

## Haemorrhagic stroke

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **LaLiberte 2014** | (ICD9) | 430  431  432  852  853  854  438 | Subarachnoid hemorrhage with 438.xx during hospitalization  Intracerebral hemorrhage with 438.xx during hospitalization  Other unspecified intracranial hemorrhage with 438.xx during hospitalization  Subarachnoid, subdural, and extradural hemorrhage following injury with  Other unspecified intracranial hemorrhage following injury with 438.xx during hospitalization  Intracranial injury of other and unspecified nature with 438.xx during hospitalization  Late effects of cerebrovascular disease |
| **Yao 2016** | (ICD9) | 430  431 | Subarachnoid hemorrhage with 438.xx during hospitalization  Intracerebral hemorrhage with 438.xx during hospitalization |
| **Lauffenburger 2015** | (ICD9) | 430  431  432 | Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage |
| **Seeger 2015** | (ICD9) | 431.x | Intracerebral hemorrhage |
| **Villines  2015** | (ICD9) | 430  431 | Subarachnoid hemorrhage  Intracerebral hemorrhage |

## Systemic embolism

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **LaLiberte 2014** | (ICD9) | 444 | Arterial embolism and thrombosis |
| **Bouillon 2015** | (ICD10) | I74 (444) | Arterial embolism and thrombosis |
| **Maura 2015** | (ICD10) | I74 (444) | Arterial embolism and thrombosis |
| **Larsen 2016** | (ICD10) | I74 | Arterial embolism and thrombosis |
| **Yao 2016** | (ICD9) | 444 | Arterial embolism and thrombosis |
| **Larsen 2013** | (ICD10) | I74(444xx) | Arterial embolism and thrombosis |
| **Seeger 2015** | (ICD9) | 444.x | Arterial embolism |

## VTE

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **LaLiberte 2014** | (ICD9) | 451.1x  451.2x  453.xx  415.1xx | Phlebitis and thrombophlebitis of deep vessels of lower extremities  Phlebitis and thrombophlebitis of lower extremities, unspecified  Other venous embolism and thrombosis  Pulmonary embolism and infarction |
| **GorstRasmussen 2016** | (ICD10) | I26  I80.1/2/9  I81.9  I63.6  I67.6  I82.2/3/8/9 | Pulmonary embolism  Phlebitis and thrombophlebitis (limited)  Embolism and thrombosis of unspecified vein  Cerebral infarction due to cerebral venous thrombosis, nonpyogenic  Nonpyogenic thrombosis of intracranial venous system  Embolism and thrombosis (limited) |
| **Lauffenburger 2015** | (ICD9) | 415  451  453 | Acute pulmonary heart disease  Phlebitis and thrombophlebitis  Other venous embolism and thrombosis |
| **Seeger 2015** | (ICD9) | 451.1x/2x/81/91  453.1x/2x/8x/9x/40/41/42/0 | Phlebitis and thrombophlebitis (limited)  Other venous embolism and thrombosis (limited) |
| **Villines  2015** | (ICD9) | 451.1x  453.xx  415.xx | Phlebitis and thrombophlebitis of deep vessels of lower extremities  Other venous embolism and thrombosis  Acute pulmonary heart disease |
| **LaLiberte 2014** | (ICD9) | 451.1x  451.2x  453.xx  415.1xx | Phlebitis and thrombophlebitis of deep vessels of lower extremities  Phlebitis and thrombophlebitis of lower extremities, unspecified  Other venous embolism and thrombosis  Pulmonary embolism and infarction |
| **GorstRasmussen 2016** | (ICD10) | I26  I80.1/2/9  I81.9  I63.6  I67.6  I82.2/3/8/9 | Pulmonary embolism  Phlebitis and thrombophlebitis (limited)  Embolism and thrombosis of unspecified vein  Cerebral infarction due to cerebral venous thrombosis, nonpyogenic  Nonpyogenic thrombosis of intracranial venous system  Embolism and thrombosis (limited) |

## MI

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **Coleman 2016** | (ICD10) | I21 (410)  I22 | Acute myocardial infarction  Subsequent myocardial infarction |
| **Bouillon 2015** | (ICD10) | I21 (410)  I25 (414) | Acute myocardial infarction  Chronic ischemic heart disease |
| **GorstRasmussen 2016** | (ICD10) | I21  I22  I23 | Acute myocardial infarction  Subsequent myocardial infarction  Certain current complications following acute myocardial infarction |
| **Bengston 2016** | (ICD9CM) | 410 | Acute myocardial infarction (excluding 410.x2, used to indicate follow-up of the initial episode) in the ﬁrst or second position |
| **Lauffenburger 2015** | (ICD9) | 410.x1 | Acute myocardial infarction of anterolateral wall, initial episode of care |
| **Graham 2014** | (ICD9) | 410 (not all) | Acute myocardial infarction (limited) |
| **Larsen 2014** | (ICD10) | I21  I22  I23 | Acute myocardial infarction  Subsequent myocardial infarction  Certain current complications following acute myocardial infarction |
| **Larsen 2013** | (ICD10) | I21(410xx)  I22  I23(429xx) | Acute myocardial infarction  Subsequent myocardial infarction  Certain current complications following acute myocardial infarction |
| **Seeger 2015** | (ICD9) | 410.X | Acute myocardial infarction |
| **Chan 2016** | (ICD9) | 410  411  412 | Acute myocardial infarction  Other acute and subacute forms of ischemic heart disease  Old myocardial infarction |
| **Villines 2015** | (ICD9) | 410.xx | Acute myocardial infarction |
| **Tsadok 2015** | (ICD9) (ICD10) | 410  I21  I22 | Acute myocardial infarction  Acute myocardial infarction  Subsequent myocardial infarction |
| **Larsen 2014** | (ICD10) | I21(410xx) | Acute myocardial infarction |

## ICH

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **LaLiberte 2014** | (ICD9) | 430  432  852  854 | Subarachnoid haemorrhage  Other and unspecified intracranial hemorrhage  Subarachnoid, subdural, and extradural hemorrhage, following injury  Intracranial injury of other and unspecified nature |
| **Coleman 2016** | (ICD10) | I61 | Intracerebral haemorrhage |
| **Bouillon 2015** | (ICD10) | I60  I61  I62  S06.3  S06.4  S06.5  S06.6 | Subarachnoid hemorrhage  Intracranial haemorrhage  Other nontraumatic intracranial haemorrhage  Focal brain injury  Epidural haemorrhage  Traumatic subdural haemorrhage  Traumatic subarachnoid haemorrhage |
| **Maura 2015** | (ICD10) | I60  I61  I62  S06.3 | Subarachnoid hemorrhage  Intracranial haemorrhage  Other nontraumatic intracranial haemorrhage  Focal brain injury |
| **GorstRasmussen 2016** | (ICD10) | I60  I61  I62 | Subarachnoid hemorrhage  Intracranial haemorrhage  Other nontraumatic intracranial haemorrhage |
| **Larsen 2016** | (ICD10) | I60  I61  I62 | Subarachnoid hemorrhage  Intracranial haemorrhage  Other nontraumatic intracranial haemorrhage |
| **Yao 2016** | (ICD9) | 430  431  432  852  853 | Subarachnoid haemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage  Subarachnoid, subdural, and extradural hemorrhage, following injury  Other and unspecified intracranial hemorrhage following injury |
| **Bengston 2016** | (ICD9CM) | 430  431 | Subarachnoid hemorrhage  Intracerebral hemorrhage |
| **Halvorsen 2016** | (ICD10) | I60  I61  I62  I690  I691  I692 | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  Sequelae of subarachnoid haemorrhage  Sequelae of intracerebral haemorrhage  Sequelae of other nontraumatic intracranial |
| **Francis 2015** | (ICD9) | 430  431  432  852.0/2/4  853.0 | Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage  Subarachnoid subdural and extradural hemorrhage following injury (limited)  Other and unspecified intracranial hemorrhage following injury without mention of open intracranial wound |
| **Tsadok 2016** | (ICD10) | I60 (430)  I61 (431)  I62 (432) | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage |
| **Alonso 2014** | (ICD9) | 430  431  432  852 | Subarachnoid hemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  Subarachnoid subdural and extradural hemorrhage following injury |
| **Larsen 2014** | (ICD10) | I60 (430.xx)  I61 (431.xx)  I62 (432.xx)  S06.3C  S06.4  S06.5  S06.6 | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  Focal brain injury  Epidural haemorrhage  Traumatic subdural haemorrhage  Traumatic subarachnoid haemorrhage |
| **Graham 2014** | (ICD9) | 430  431  432  852.0/2/4  853.0 | Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage  Subarachnoid subdural and extradural hemorrhage following injury (limited)  Other and unspecified intracranial hemorrhage following injury without mention of open intracranial wound |
| **Larsen 2014** | (ICD10) | I60 (430)  I61 (431)  I62 (432.xx)  S063C  S064  S065  S066  H356(36281) | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  ?  ?  ?  Retinal haemorrhage  ? |
| **Larsen 2013** | (ICD10) | I60 (430)  I61 (431)  I62 (432x)  S06.4 (800xx)  S06.5 (800xx)  S06.6 (800xx) | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  Epidural haemorrhage  Traumatic subdural haemorrhage  Traumatic subarachnoid haemorrhage |
| **Seeger 2015** | (ICD9) | 430.x  431.x  432.x  432.1x | Subarachnoid hemorrhage (SAH)  Intracerebral hemorrhage (ICH)  Other and unspecified intracranial hemorrhage, including subdural hemorrhage |
| **Chan 2016** | (ICD9) | 430  431  432 | Subarachnoid hemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage |
| **Villines 2015** | (ICD9) | 430  431  432.x | Subarachnoid hemorrhage  Intracerebral hemorrhage  Other nontraumatic intracranial haemorrhage |
| **Tsadok 2015** | (ICD9) (ICD10) | 430  431  432  I60  I61  I62 | Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage  Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage |
| **Vaughan 2014** | (ICD9) |  | Intracranial Hemorrhage |
| **Hernandez 2015** | (ICD9) | 430  431  432 | Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage |

## GI bleed

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **LaLiberte 2014** | (ICD9) | 531.0x  531.2x  532.0x  532.2x  533.0x  533.2x  534.0x  534.2x  537.83  569.83  578.xx | Acute gastric ulcer with hemorrhage  Acute gastric ulcer with hemorrhage and perforation  Acute duodenal ulcer with hemorrhage  Acute duodenal ulcer with hemorrhage and perforation  Acute peptic ulcer of unspecified site with hemorrhage  Acute peptic ulcer of unspecified site with hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage  Acute gastrojejunal ulcer with hemorrhage and perforation  Angiodysplasia of stomach and duodenum with hemorrhage  Perforation of intestine  Gastrointestinal hemorrhage |
| **Abraham 2015** | (ICD9) | 455.x  456.x  530.82  531.0531.6  532.0532.6  533.0533.6  534.0534.6  535.01535.61  537.83  562.xx  568.81  569.x  578.x | Hemorrhoids  Varicose veins of other sites  Esophageal hemorrhage  Gastric ulcer (limited)  Duodenal ulcer (limited)  Peptic ulcer, site unspecified (limited)  Gastrojejunal ulcer (limited)  Gastritis and duodenitis (limited)  Angiodysplasia of stomach and duodenum with hemorrhage  Diverticula of intestine  Other specified disorders of peritoneum (limited)  Other disorders of intestine  Gastrointestinal hemorrhage |
| **GorstRasmussen** | (ICD10) | K25  K26  K27  K28  K29 | Gastric ulcer  Duodenal ulcer  Peptic ulcer, site unspecified  Gastrojejunal ulcer  Gastritis and duodenitis |
| **Yao 2016** | (ICD9) | 456.0/20  530.21/7/82  531.0x/2x/4x/6x  532.0x/2x/4x/6x  533.0x/2x/4x/6x  534.0x/2x/4x/6x  535.01/11/21/31/41/51/61/71  537.83/84  562.02/03/12/13  568.81  569.3/85  578.x | Varicose veins of other sites (limited)  Diseases of esophagus (limited)  Gastric ulcer (limited)  Duodenal ulcer (limited)  Peptic ulcer, site unspecified (limited)  Gastrojejunal ulcer (limited)  Gastritis and duodenitis (limited)  Other disorders of stomach and duodenum  Diverticula of intestine  Other specified disorders of peritoneum (limited)  Bleeding rectal  Gastrointestinal hemorrhage |
| **Halvorsen 2016** | (ICD10) | K920  K921  K922  K250  K252  K254  K256  K260  K262  K264  K266  K270  K272  K274  K276  K280  K282  K284  K286  K625  K228  K221  K290  I850 | Hematemesis  Melena  Unspecified GI bleeding  Gastric ulcer with bleeding  Gastric ulcer with both perforation and bleeding  Chronic or unspecified gastric ulcer with bleeding  Chronic or unspecified gastric ulcer with both perforation and bleeding  Duodenal ulcer with bleeding  Duodenal ulcer with both perforation and bleeding  Chronic or unspecified duodenal ulcer with bleeding  Chronic or unspecified gastric ulcer with both perforation and bleeding  Unspecified peptic ulcer with bleeding  Unspecified peptic ulcer with both perforation and bleeding  Chronic or unspecified peptic ulcer with bleeding  Chronic or unspecified peptic ulcer with both perforation and bleeding  Gastrojejunal ulcer with bleeding  Gastrojejunal ulcer with both perforation and bleeding  Chronic or unspecified gastrojejunal ulcer with bleeding  Chronic or unspecified gastric ulcer with both perforation and bleeding  Haemorrhage from anus and rectum  Haemorrhage of the oesophagus  Ulcer of oesophagus with bleeding  Acute gastritis with bleeding  Oesophageal varices with bleeding |
| **Francis 2015** | (ICD9) | 455.2/5/8  456.0/20  459.0  530.7/82  531.0/2/4/6  532.0  532.2  532.4  532.6  533.0  533.2  533.4  533.6  534.0  534.2  534.4  534.6  535.01  535.11  535.21  535.31  535.41  535.51  535.61  537.83  562.02/03/12/13  568.81  569.3/85  578 | Internal hemorrhoids with other complication/External hemorrhoids with other complication/Unspecified hemorrhoids with other complication  Esophageal varices with bleeding/Esophageal varices in disease classified elsewhere,with bleeding  Hemorrhage, Unspecified  Gastroesophageal lacerationHemorrhage syndrome/Esophageal Hemorrhage  Acute gastric ulcer with Hemorrhage /Acute gastric ulcer with Hemorrhage and perforation /Chronic or Unspecified gastric ulcer with Hemorrhage /Chronic or Unspecified gastric ulcer with Hemorrhage and perforation  Acute duodenal ulcer with Hemorrhage  Acute duodenal ulcer with Hemorrhage and Current Medical Research and Opinion perforation  Chronic or Unspecified duodenal ulcer with Hemorrhage  Chronic or Unspecified duodenal ulcer with Hemorrhage and perforation  Acute peptic ulcer of Unspecified site with Hemorrhage  Acute peptic ulcer of Unspecified site with Hemorrhage and perforation  Chronic or Unspecified peptic ulcer of Unspecified site with Hemorrhage  Chronic or Unspecified peptic ulcer of Unspecified site with Hemorrhage and perforation  Acute gastrojejunal ulcer with Hemorrhage  Acute gastrojejunal ulcer with Hemorrhage and perforation  Chronic or Unspecified gastrojejunal ulcer with Hemorrhage  Chronic or Unspecified gastrojejunal ulcer with Hemorrhage and perforation  Acute gastritis, with Hemorrhage  Atrophic gastritis, with Hemorrhage  gastric mucosal hypertrophy, with Hemorrhage  Alcoholic gastritis, with Hemorrhage  Other specified gastritis, with Hemorrhage  Unspecified gastritis and gastroduodenitis, with Hemorrhage  Duodenitis, with Hemorrhage  Angiodysplasia of stomach and duodenum with Hemorrhage Current Medical Research and Opinion  Diverticulosis of small intestine with Hemorrhage/Diverticulitis of small intestine with Hemorrhage/ Diverticulosis of colon with Hemorrhage/ Diverticulitis of colon with Hemorrhage  Hemoperitoneum (nontraumatic)  Hemorrhage of rectum and anus / Angiodysplasia of intestine with Hemorrhage  Gastrointestinal Hemorrhage |
| **Tsadok 2016** | (ICD10) | K25.0 (531.0)  K25.2 (531.2)  K25.4 (531.4)  K25.6 (531.6)  K26.0 (532.0)  K26.2 (532.2)  K26.4 (532.4)  K26.6 (532.6)  K27.0 (533.0)  K27.2 (533.2)  K27.4 (533.4)  K27.6 (533.6)  K28.0 (534.0)  K28.2 (534.2)  K28.4 (534.4)  K28.6 (534.6)  K29.0 (535.0)  K92.1 (578.1)  K92.2 (578.2) | Acute gastric ulcer with hemorrhage  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  Chronic or unspecified with both haemorrhage and perforation  Acute gastric ulcer with hemorrhage  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  Chronic or unspecified with both haemorrhage and perforation  Acute gastric ulcer with hemorrhage  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  Chronic or unspecified with both haemorrhage and perforation  Acute gastric ulcer with hemorrhage  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  Chronic or unspecified with both haemorrhage and perforation  Acute haemorrhagic gastritis  Melaena  Gastrointestinal haemorrhage, unspecified |
| **Lauffenburger 2015** | (ICD9) | 455.2  455.5  455.8  456.0  456.20  459.0  530.82  578 | Internal hemorrhoids with Other complication  External hemorrhoids with Other complication  Unspecified hemorrhoids with Other complication  Esophageal varices with bleeding  Esophageal varices in diseases classified elsewhere, with bleeding  Hemorrhage, Unspecified  Esophageal Hemorrhage  Gastrointestinal Hemorrhage |
| **Alonso 2014** | ICD(9) | 455.2x/5x/8x  456.0x/456.20  530.7x  530.82  531.0x  531.2x  531.4x  531.6x  532.0x  532.2x  532.4x  532.6x  533.0x  533.2x  533.4x  533.6x  534.0x  534.2x  534.4x  534.6x  535.01  535.11  535.21  535.31  535.41  535.51  535.61  537.83  562.03  562.03  562.12  562.13  568.81  569.3x  569.85  578.0x  578.1x/578.9x | Internal hemorrhoids with other complication/Unspecified hemorrhoids with other complication/Esophageal varices with bleeding  Esophageal varices in diseases classified elsewhere/Gastroesophageal lacerationhemorrhage syndrome  Esophageal hemorrhage  Acute gastric ulcer with hemorrhage  Acute gastric ulcer with hemorrhage and perforation  Chronic or unspecified gastric ulcer with hemorrhage  Chronic or unspecified gastric ulcer with hemorrhage and perforation  Acute duodenal ulcer with hemorrhage  Acute duodenal ulcer with hemorrhage and perforation  Chronic or unspecified duodenal ulcer with hemorrhage  Chronic or unspecified duodenal ulcer with hemorrhage and perforation  Acute peptic ulcer of unspecified site with hemorrhage  Acute peptic ulcer of unspecified site with hemorrhage and perforation  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage  Acute gastrojejunal ulcer with hemorrhage and perforation  Chronic or unspecified gastrojejunal ulcer with hemorrhage  Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation  Acute gastritis, with hemorrhage  Atrophic gastritis, with hemorrhage  Gastric mucosal hypertrophy, with hemorrhage  Alcoholic gastritis, with hemorrhage  Other specified gastritis, with hemorrhage  Unspecified gastritis and gastroduodenitis, with hemorrhage  Duodenitis, with hemorrhage  Angiodysplasia of stomach and duodenum with hemorrhage  Diverticulitis of small intestine with hemorrhage  Diverticulosis of colon with hemorrhage  Diverticulitis of colon with hemorrhage  Hemoperitoneum (nontraumatic)  Hemorrhage of rectum and anus  Hematemesis  Blood in stool/Hemorrhage of gastrointestinal tract, unspecified |
| **Larsen 2014** | (ICD10) | K250 (531.xx)  K260 (532.xx)  K270 (533.xx)  K280 (534.xx)  K290 (535.xx) | Gastric ulcer  Duodenal ulcer  Peptic ulcer, site unspecified  Gastrojejunal ulcer  Acute haemorrhagic gastritis |
| **Larsen 2014** | (ICD10) | K250(531.xx)  K260 (532.xx)  K270 (533.xx)  K280 (534.xx)  K290(535.xx) | Gastric ulcer  Duodenal ulcer  Peptic ulcer, site unspecified  Gastrojejunal ulcer  Acute haemorrhagic gastritis |
| **Larsen 2013** | (ICD10) | K25(531xx)  K26(532xx)  K27(533xx)  K28(533xx)  K29(534xx) | Gastric ulcer  Duodenal ulcer  Peptic ulcer, site unspecified  Gastrojejunal ulcer  Gastritis and duodenitis |
| **Seeger 2015** | (ICD9) | Upper GI bleed  531.0x/2x/4x/6x  532.0x/2x/4x/6x  533.0x/2x/4x/6x  534.0x/2x/4x/6x  578.0  Lower GI bleeding  562.02/03  562.12/3  569.3x/569.85  578.1x  578.9 | Upper GI bleed  acute gastric ulcer with hemorrhage with/without obstruction/ chronic or unspecified gastric ulcer with hemorrhage with/without obstruction  acute duodenal ulcer with hemorrhage with/without obstruction  chronic or unspecified duodenal ulcer with hemorrhage with/without obstruction acute peptic ulcer of unspecified site with hemorrhage with/without obstruction  chronic or unspecified peptic ulcer of unspecified site with hemorrhage with/without obstruction  acute gastrojejunal ulcer with hemorrhage with/without obstruction chronic or unspecified gastrojejunal ulcer with hemorrhage with/without obstruction  hematemesis  Lower GI bleeding  Diverticulosis of small intestine with hemorrhage/Diverticulitis of small intestine with hemorrhage  Diverticulosis of colon with hemorrhage/Diverticulitis of colon with hemorrhage  Hemorrhage of rectum and anus/Angiodysplasia of intestine with hemorrhage  Blood in stool  Hemorrhage of GI tract, unspecified |
| **Staerk 2015** | (ICD10) | K25.0/2/6K26.0  K26.2/6  K27.0/2/6  K28.0/2/6K29.0  K29.8A | Acute gastric ulcer with hemorrhage/Acute gastric ulcer with both hemorrhage and perforation/Chronic or unspecified gastric ulcer with both hemorrhage and perforation  Acute duodenal ulcer with hemorrhage/Acute duodenal ulcer with both hemorrhage and perforation  Chronic or unspecified duodenal ulcer with both hemorrhage and perforation  Acute peptic ulcer, site unspecified, with hemorrhage/Acute peptic ulcer, site unspecified, with both hemorrhage and perforation/Chronic or unspecified peptic ulcer, site unspecified, with both hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage/Acute gastrojejunal ulcer with both hemorrhage and perforation/Chronic or unspecified gastrojejunal ulcer with both hemorrhage and perforation  Acute gastritis  Duodenitis |
| **Chan 2016** | (ICD9) | 530.7  531.0/2/4/6532.0  532.2  532.4  532.6  533.0  533.2  533.4  533.6  534.0  534.2  534.4  534.6  535.01/11/21/31/41/51/61/71  535.11  535.21  535.31  535.41  535.51  535.61  535.71  537.83 /537.84  562.02 /562.03  562.12 /562.13  569.3/569.85  578 | Gastroesophageal laceration hemorrhage syndrome  Acute gastric ulcer with hemorrhage/Acute gastric ulcer with hemorrhage and perforation/Chronic or unspecified gastric ulcer with hemorrhage/Chronic or unspecified gastric ulcer with hemorrhage and perforation  Acute duodenal ulcer with hemorrhage  Acute duodenal ulcer with hemorrhage and perforation  Chronic or unspecified duodenal ulcer with hemorrhage  Chronic or unspecified duodenal ulcer with hemorrhage and perforation  Acute peptic ulcer of unspecified site with hemorrhage  Acute peptic ulcer of unspecified site with hemorrhage and perforation  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage  Acute gastrojejunal ulcer with hemorrhage and perforation  Chronic or unspecified gastrojejunal ulcer with hemorrhage  Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation  Acute gastritis, with hemorrhage/Atrophic gastritis, with hemorrhage/Gastric mucosal hypertrophy, with hemorrhage/Alcoholic gastritis, with hemorrhage/Other specified gastritis, with hemorrhage/Unspecified gastritis and gastroduodenitis, with hemorrhage/Duodenitis, with hemorrhage/Eosinophilic gastritis, with hemorrhage  Angiodysplasia of stomach and duodenum with hemorrhage/Dieulafoy lesion (hemorrhagic) of stomach and duodenum  Diverticulosis of small intestine with hemorrhage /Diverticulitis of small intestine with hemorrhage  Diverticulosis of colon with hemorrhage/Diverticulitis of colon with hemorrhage  Hemorrhage of rectum and anus/Angiodysplasia of intestine with hemorrhage  Gastrointestinal hemorrhage |
| **Villines 2015** | (ICD9) | 531.0x /2x/4x/6x  532.0x  532.2x  532.4x  532.6x  533.0x  533.2x  533.4x  533.6x  534.0x  534.2x  534.4x  534.6x  578.0  562.02  562.03  562.12  562.13  569.3x  569.85  578.1x  578.9 | Acute gastric ulcer with hemorrhage/Acute gastric ulcer with hemorrhage and perforation/Chronic or unspecified gastric ulcer with hemorrhage/Chronic or unspecified gastric ulcer with hemorrhage and perforation  Acute duodenal ulcer with hemorrhage  Acute duodenal ulcer with hemorrhage and perforation  Chronic or unspecified duodenal ulcer with hemorrhage  Chronic or unspecified duodenal ulcer with hemorrhage and perforation  Acute peptic ulcer of unspecified site with hemorrhage  Acute peptic ulcer of unspecified site with hemorrhage and perforation  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage  Acute gastrojejunal ulcer with hemorrhage and perforation  Chronic or unspecified gastrojejunal ulcer with hemorrhage  Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation hematemesis  Diverticulosis of small intestine with hemorrhage  Diverticulitis of small intestine with hemorrhage  Diverticulosis of colon with hemorrhage  Diverticulitis of colon with hemorrhage  Hemorrhage of rectum and anus  Angiodysplasia of intestine with hemorrhage  Blood in stool  Hemorrhage of GI tract, unspecified |
| **Tsadok 2015** | (ICD9) (ICD10) | 530.7  531.0/2/4/6  532.0/2/4/6  533.0/2/4/6  534.0/2/4/6  578  K25.0/2/4/6  K26.0/2/4/6  K27.0/2/4/6  K28.0/2/4/6  K29.0  K92.1/2 | Gastroesophageal laceration-hemorrhage syndrome  Gastric ulcer (limited)  Duodenal ulcer (limited)  Peptic ulcer site unspecified (limited)  Gastrojejunal ulcer (limited)  Gastrointestinal hemorrhage |
| **Vaughan 2014** | (ICD9) | Not reported | Gastrointestinal Hemorrhage |
| **Hernandez 2015** | (ICD9) | 530.7  531.0/2/4/6  532.0/2/4/6  533.0/2/4/6  534.0/2/4/6  569.3  535.01/11/21/31/41/51/61/71  537.83/84  562.02/03/12/13  569.85  578 | Gastroesophageal laceration-hemorrhage syndrome  Gastric ulcer (limited)  Duodenal ulcer (limited)  Peptic ulcer site unspecified (limited)  Gastrojejunal ulcer (limited)  Hemorrhage of rectum and anus  Gastritis and duodenitis (limited)  Other disorders of stomach and duodenum (limited)  Diverticula of intestine (limited)  Angiodysplasia of intestine with hemorrhage  Gastrointestinal hemorrhage |

## Major bleed

|  | **System** | **Codes** | **Codes description** |
| --- | --- | --- | --- |
| **LaLiberte 2014** | (ICD9) | 360.43  362.81  363.6162  372.72  376.32  379.23  423.0  430  431  432  568  719  852  853  854 | Hemophthalmos, except current injury  Retinal hemorrhage  Choroidal hemorrhage (limited)  Conjunctival hemorrhage  Orbital hemorrhage  Vitreous hemorrhage  Hemopericardium  Subarachnoid hemorrhage  Intracerebral hemorrhage  Other unspecified intracranial hemorrhage  Hemoperitoneum (nontraumatic)  Hemarthrosis  Subarachnoid, subdural, and extradural hemorrhage following injury  Other unspecified intracranial hemorrhage following injury  Intracranial injury of other and unspecified nature |
| **Larsen 2016** | (ICD10) | D62  J942  H113  H356  H431  N02  N95  R04  R31  R58 | Acute posthaemorrhagic anaemia  Hemothorax  Conjunctival hemorrhage, bilateral  Retinal haemorrhage  Vitreous haemorrhage  Recurrent and persistent haematuria  Menopausal and other perimenopausal disorders  Haemorrhage from respiratory passages  Unspecified haematuria  Haemorrhage, not elsewhere classified |
| **Nelson 2016** | (ICD9CM ) |  | validated algorithm developed by Cunningham et al. designed to identify hospitalizations related to bleeding |
| **Lip 2016** | (ICD9CM ) |  | Based on first listed diagnosis code in hospital claims |
| **Yao 2016** | (ICD9CM) | ICH:  430  431  432  852  853  GI  456.0/20  530.21/7/82  531.0x/2x/4x/6x  532.0x/2x/4x/6x  533.0x/2x/4x/6x  534.0x/2x/4x/6x  535.01/11  535.21  535.31/41  535.51/61/71  537.83/84  562.02/03  562.12/13  568.81  569.3  569.85  578.x  Other sites  423.0  459.0  596.7  599.71  719.1x  784.8  786.3 |  |
| **Halvorsen 2016** | (ICD10) | I60  I61  I62  K920  K921  I690  I691  I692  I230  I312  M250  H431  H356  H313  H450  H448  J942  K661 | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  Haematemesis  Melaena  Sequelae of subarachnoid haemorrhage  Sequelae of intracerebral haemorrhage  Sequelae of other nontraumatic intracranial haemorrhage  Haemopericardium as current complication following acute myocardial infarction  Haemopericardium, not elsewhere classified  Hemarthrosis  Vitreous haemorrhage  Retinal haemorrhage  Choroidal haemorrhage and rupture  Vitreous haemorrhage in diseases classified elsewhere  Other disorders of the globe, haemophtlamos  Haemothorax  Haemoperitoneum |
| **Lip 2016** | (ICD9CM ) |  | Based on first listed diagnosis code in hospital claims |
| **Francis 2015** | (ICD9) | 599.7  719.1x  786.3  423.0  593.81  784.7  784.8 | Hematuria  Hemarthrosis  Hemoptysis  Hemopericardium  Vascular disorders of kidney  Epistaxis  Hemorrhage from throat |
| **Tsadok 2016** | (ICD10) | H35.6(362.8)  H43.1(379.2)  I71.0(441.0)  I71.1(441.1)  I71.3(441.3,)  I71.5(441.5)  I71.8(441.8)  N02(581.1)  R31(599.7)  R04.2(784.7)  R04.0(786.3) | Retinal haemorrhage  Vitreous haemorrhage  Dissection of aorta [any part]  Thoracic aortic aneurysm, ruptured  Abdominal aortic aneurysm, ruptured  Thoracoabdominal aortic aneurysm, ruptured  Aortic aneurysm of unspecified site, ruptured  Recurrent and persistent haematuria  Unspecified haematuria  Haemoptysis  Epistaxis |
| **Lauffenburger 2015** | (ICD9) | 423.0  593.81  599.7  719.11  784.7  784.8  786.3 | Hemopericardium  Vascular disorders of kidney  Hematuria  Hemarthrosis, shoulder region  Epistaxis  Hemorrhage from throat  Apnea |
| **Larsen 2014** | (ICD10) | D62 (285.1)  J942(511.xx)  H113(372.72)  H356(362.81)  H431(379.23)  N02(581.1)  N95 (627.xx)  R04 (784.xx,786.xx)  R31 (599.7x)  R58(459.0)  H35.6(362.81) | Acute posthaemorrhagic anaemia  Haemothorax  Conjunctival haemorrhage  Retinal haemorrhage  Vitreous haemorrhage  Recurrent and persistent haematuria  Menopausal and other perimenopausal disorders  Haemorrhage from respiratory passages  Unspecified haematuria  Haemorrhage, not elsewhere classified  Retinal haemorrhage |
| **Graham 2014** | (ICD9) | 430/431/432  852.0  852.2  852.4  853.0  336.1  363.6  372.72  376.32  377.42  379.23  719.1  729.92  729.97  423.0  593.81  772.5  866.01  866.02  866.11  866.12  9903  9904  9905  9906  9907  9909  P9010  P9011  P9016  P9017  P9019  P9020  P9021  P9022  P9023  P9031  P9032  P9033  P9034  P9035  P9036  P9037  P9038  P9039  P9040  P9044  P9051  P9052  P9053  P9054  P9055  P9056  P9057  P9058  P9059  P9060  0380  0381  0382  0383  0384  0385  0386  0387  0388  0389  0390  0391  0392  0399  37/38/39 | Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage  Subarachnoid hemorrhage following injury without mention of open intracranial wound  Subdural hemorrhage following injury without mention of open intracranial wound  Extradural hemorrhage following injury without mention of open intracranial wound  Other and unspecified intracranial hemorrhage following injury without mention of open intracranial wound  Vascular myelopathies  Choroidal hemorrhage and rupture  Conjunctival hemorrhage  Orbital hemorrhage  Hemorrhage in optic nerve sheaths  billable medical code that can be used to indicate a diagnosis on a reimbursement claim  Hemarthrosis  Nontraumatic hematoma of soft tissue  Hemopericardium  Vascular disorders of kidney  Adrenal hemorrhage of fetus or newborn  Injury to kidney without mention of open wound into cavity, hematoma without rupture of capsule  Injury to kidney without mention of open wound into cavity, laceration  Injury to kidney with open wound into cavity, hematoma without rupture of capsule  Injury to kidney with open wound into cavity, laceration  Other Transfusion Of Whole Blood  Transfusion Of Packed Cells  Transfusion Of Platelets  Transfusion Of Coagulation Factors  Transfusion Of Other Serum  Transfusion Of Other Substance  Blood (whole), for transfusion, per unit  Blood, split unit  Red blood cells, leukocytes reduced, each unit  Fresh frozen plasma (single donor), frozen within 8 hours of collection, each unit  Platelets, each unit  Platelet rich plasma, each unit  Red blood cells, each unit  Red blood cells, washed, each unit  Plasma, pooled multiple donor, solvent/detergent treated, frozen, each unit  Platelets, leukocytes reduced, each unit  Platelets, irradiated, each unit  Platelets, leukocytes reduced, irradiated, each unitPlatelets, pheresis, each unit  Platelets, pheresis, leukocytes reduced, each unit  Platelets, pheresis, irradiated, each unit  Platelets, pheresis, leukocytes reduced, irradiated, each unit  Red blood cells, irradiated, each unit  Red blood cells, deglycerolized, each unit  Red blood cells, leukocytes reduced, irradiated, each unit  Plasma, cryoprecipitate reduced, each unit  Whole blood or red blood cells, leukocytes reduced, cmvnegative, each unit  Platelets, hlamatched leukocytes reduced, apheresis/pheresis, each unit  Platelets, pheresis, leukocytes reduced, cmvnegative, irradiated, each unit  Whole blood or red blood cells, leukocytes reduced, frozen, deglycerol, washed, each unit  Platelets, leukocytes reduced, cmvnegative, apheresis/pheresis, each unit  Whole blood, leukocytes reduced, irradiated, each unit  Red blood cells, frozen/deglycerolized/washed, leukocytes reduced, irradiated, each unit  Red blood cells, leukocytes reduced, cmvnegative, irradiated, each unit  Fresh frozen plasma between 824 hours of collection, each unit  Fresh frozen plasma, donor retested, each unit |
| **Larsen 2014** | (ICD10) | D62 (2851)  J942(511.xx)  H113(37272)  H356(36281)  H431(37923)  N02(5811)  N95 ()  R04 ()  R31 ()  R58(4590) | Acute posthaemorrhagic anaemia  Haemothorax  Conjunctival haemorrhage  Retinal haemorrhage  Vitreous haemorrhage  Recurrent and persistent haematuria  Menopausal and other perimenopausal disorders  Haemorrhage from respiratory passages  Unspecified haematuria  Haemorrhage, not elsewhere classified |
| **Larsen 2013** | (ICD10) | Major  D62.9(285x)  J94.2(511x)  N02(581x)  R04(784x)  R31(599xx)  R58(459x)  N95(627x)  ICH  I60(430)  I61(431)  I62(432x)  S06.4(800xx)  S06.5(800xx)  S06.6(800xx)  GI BLEED  K25(531xx)  K26(532xx)  K27(533xx)  K28(533xx)  K29(534xx) | Major  Acute posthemorrhagic anemia  Haemothorax  Recurrent and persistent haematuria  Haemorrhage from respiratory passages  Unspecified haematuria  Haemorrhage, not elsewhere classified  Menopausal and other perimenopausal disorders  ICH  Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  Epidural haemorrhage  Traumatic subdural haemorrhage  Traumatic subarachnoid haemorrhage  GI BLEED  Gastric ulcer  Duodenal ulcer  Peptic ulcer, site unspecified  Gastrojejunal ulcer  Gastritis and duodenitis |
| **Seeger 2015** | (ICD9) | Upper GI bleed  531.0x  531.2x  531.4x  531.6x  532.0x  532.2x  532.4x  532.6x  533.0x  533.2x  533.4x  533.6x  534.0x  534.2x  534.4x  534.6x  578.0  Lower GI bleeding  562.02  562.03  562.12  562.13  569.3x  569.85  578.1x  578.9  Urogenital bleed  599.7  626.2x  280.0  285.1  285.9  Other bleed  719.1x  423.0x  786.3x  784.7x  459.0x  285.1x | Upper GI bleed  Acute gastric ulcer with hemorrhage with/without obstruction with hemorrhage and perforation with/without obstruction  Chronic or unspecified gastric ulcer with hemorrhage with/without obstruction with hemorrhage + perforation with/without obstruction  Acute duodenal ulcer with hemorrhage with/without obstruction with hemorrhage + perforation with/without obstruction  Chronic or unspecified duodenal ulcer with hemorrhage with/without obstruction with hemorrhage + perforation with/without obstruction  Acute peptic ulcer of unspecified site with hemorrhage with/without obstruction with hemorrhage + perforation with/without obstruction  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage with/without obstruction  Acute gastrojejunal ulcer with hemorrhage with/without obstruction with hemorrhage + perforation with/without obstruction  Chronic or unspecified gastrojejunal ulcer with hemorrhage with/without obstruction with hemorrhage + perforation with/without obstruction  Hematemesis  Lower GI bleeding  Diverticulosis of small intestine with hemorrhage  Diverticulitis of small intestine with hemorrhage  Diverticulosis of colon with hemorrhage  Diverticulitis of colon with hemorrhage  Hemorrhage of rectum and anus  Angiodysplasia of intestine with hemorrhage  Blood in stool  Hemorrhage of GI tract, unspecified  Urogenital bleed  Hematuria  Excessive/frequent menstruation  Iron deficiency anemia secondary to blood loss (chronic)  Acute posthemorrhagic anemia  Anemia, unspecified  Other bleed  Hemathrosis  Hemopericardium  Hemoptysis  Epistaxis  Hemorrhage not specified  Acute posthemorrhagic anemia |
| **Staerk 2015** | (ICD10) | K25.0  K25.2  K25.6  K26.0  K26.2  K26.6  K27.0  K27.2  K27.6  K28.0  K28.2  K28.6  K29.0  K29.8A | Acute gastric ulcer with hemorrhage  Acute gastric ulcer with both hemorrhage and perforation  Chronic or unspecified gastric ulcer with both hemorrhage and perforation  Acute duodenal ulcer with hemorrhage  Acute duodenal ulcer with both hemorrhage and perforation  Chronic or unspecified duodenal ulcer with both hemorrhage and perforation  Acute peptic ulcer, site unspecified, with hemorrhage  Acute peptic ulcer, site unspecified, with both hemorrhage and perforation  Chronic or unspecified peptic ulcer, site unspecified, with both hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage  Acute gastrojejunal ulcer with both hemorrhage and perforation  Chronic or unspecified gastrojejunal ulcer with both hemorrhage and perforation  Acute gastritis  Duodenitis |
| **Pallisgaard 2015** | (ICD10) | I60  I61  I690  I691  N02  R31  K228F  K251  K252  K254  K256  K260  K262  K264  K266  K270  K272  K274  K625  K633  K638B  K638C  K850  K922 | Subarachnoid haemorrhage  Intracerebral haemorrhage  Sequelae of subarachnoid haemorrhage  Sequelae of intracerebral haemorrhage  Recurrent and persistent haematuria  Unspecified haematuria  Other specified diseases of oesophagus  Acute gastric ulcer with perforation  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  Chronic or unspecified with both haemorrhage and perforation  Acute with haemorrhage  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  chronic or unspecified with both haemorrhage and perforation  Peptic ulcer, site unspecified : acute with haemorrhage  Peptic ulcer, site unspecified : acute with both haemorrhage and perforation  Peptic ulcer, site unspecified : chronic or unspecified with haemorrhage  Haemorrhage of anus and rectum  Ulcer of intestine  Other specified diseases of intestine  Other specified diseases of intestine  Idiopathic acute pancreatitis  Gastrointestinal haemorrhage, unspecified |
| **Villines 2015** | (ICD9) | 599.7x  626.2x  280.0  285.1  285.9  719.1x  423.0x  786.3x  784.7x  459.0x  285.1x | Hamaturia  Excessive or frequent menstruation  Iron deficiency anemia secondary to blood loss (chronic)  Acute posthemorrhagic anemia  Anemia, unspecified  Hemathrosis  Hemopericardium  Hemoptysis  Epistaxis  Hemorrhage not specified  Acute posthemorrhagic anemia |
| **Pallisgaard 2015** | (ICD10) | I60  I61  I690  I691  N02  R31  K228F  K251  K252  K254  K256  K260  K262  K264  K266  K270  K272  K274  K625  K633  K638B  K638C  K850  K922 | Subarachnoid haemorrhage  Intracerebral haemorrhage  Sequelae of subarachnoid haemorrhage  Sequelae of intracerebral haemorrhage  Recurrent and persistent haematuria  Unspecified haematuria  Other specified diseases of oesophagus  Acute gastric ulcer with perforation  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  Chronic or unspecified with both haemorrhage and perforation  Acute with haemorrhage  Acute with both haemorrhage and perforation  Chronic or unspecified with haemorrhage  Chronic or unspecified with both haemorrhage and perforation  Peptic ulcer, site unspecified : acute with haemorrhage  Peptic ulcer, site unspecified : acute with both haemorrhage and perforation  Peptic ulcer, site unspecified : chronic or unspecified with haemorrhage  Haemorrhage of anus and rectum  Ulcer of intestine  Other specified diseases of intestine  Other specified diseases of intestine  Idiopathic acute pancreatitis  Gastrointestinal haemorrhage, unspecified |
| **Tsadok 2015** | (ICD9)  (ICD10) | ICH(ICD9)  430  431  432  (ICD10)  I60  I61  I62  GI Bleed(ICD9)  530.7  531.0  531.2  531.4  531.6  532.0  532.2  532.4  532.6  533.0  533.2  533.4  533.6  534.0  534.2  534.4  534.6  578  (ICD10)  K25.0  K25.2  K25.4  K25.6  K26.0  K26.2  K26.4  K26.6  K27.0  K27.2  K27.4  K27.6  K28.0  K28.2  K28.4  K28.6  K29.0  K92.1  K92.2  Other hemorrhage(ICD9)  362.8  379.2  441.0  441.1  441.3  459  578.0  599.7  784.7  786.3  (ICD10)  H35.6  H43.1  I71.0  I71.1  I71.3  I71.5  I71.8  N02  R31  R04.2  R04.0 | ICH (ICD9)  Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage  ICH (ICD10)  Subarachnoid hemorrhage  Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage  GI Bleed (ICD9)  Gastroesophageal lacerationhemorrhage syndrome  Acute gastric ulcer with hemorrhage  Acute gastric ulcer with hemorrhage and perforation  Chronic or unspecified gastric ulcer with hemorrhage  Chronic or unspecified gastric ulcer with hemorrhage and perforation  Acute duodenal ulcer with hemorrhage  Acute duodenal ulcer with hemorrhage and perforation  Chronic or unspecified duodenal ulcer with hemorrhage  Chronic or unspecified duodenal ulcer with hemorrhage and perforation  Acute peptic ulcer of unspecified site with hemorrhage  Acute peptic ulcer of unspecified site with hemorrhage and perforation  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage  Acute gastrojejunal ulcer with hemorrhage and perforation  Chronic or unspecified gastrojejunal ulcer with hemorrhage  Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation  Gastrointestinal hemorrhage  GI Bleed (ICD10)  Acute gastric ulcer with hemorrhage  Acute gastric ulcer with hemorrhage and perforation  Chronic or unspecified gastric ulcer with hemorrhage  Chronic or unspecified gastric ulcer with hemorrhage and perforation  Acute duodenal ulcer with hemorrhage  Acute duodenal ulcer with hemorrhage and perforation  Chronic or unspecified duodenal ulcer with hemorrhage  Chronic or unspecified duodenal ulcer with hemorrhage and perforation  Acute peptic ulcer of unspecified site with hemorrhage  Acute peptic ulcer of unspecified site with hemorrhage and perforation  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation  Acute gastrojejunal ulcer with hemorrhage  Acute gastrojejunal ulcer with hemorrhage and perforation  Chronic or unspecified gastrojejunal ulcer with hemorrhage  Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation  Gastrointestinal hemorrhage  Melaena  Gastrointestinal haemorrhage, unspecified  Other hemorrhage (ICD9)  Other retinal disorders  Disorders of vitreous body  Dissection of aorta  Thoracic aneurysm, ruptured  Abdominal aneurysm, ruptured  Other disorders of circulatory system  Hematemesis  Hematuria  Epistaxis  Hemoptysis  Other hemorrhage (ICD10)  Other retinal disorders  Disorders of vitreous body  Dissection of aorta  Thoracic aneurysm, ruptured  Abdominal aneurysm, ruptured  Thoracoabdominal aortic aneurysm, ruptured  Aortic aneurysm of unspecified site, ruptured  Recurrent and persistent haematuria  Recurrent and persistent haematuria  Hemoptysis  Epistaxis |
| **Pallisgaard 2016** | (ICD10) | I60(430)  I61(431)  I62(432x)  I69.0  I69.1  I69.2  J94.2(511x)  K25.0(531xx)  K25.4(531xx)  K26.0(532xx)  K26.4(532xx)  K27.0(533xx)  K28.0(534xx)  K92.1(578x)  K92.0(578x)  K92.2(578x)  N02(581x)R02  R31(599xx)  S06.4(800x)  S06.5(800x)  S06.6(800x)  K25.2(531xx)  K25.6(531xx)  K26.0(532xx)  K26.(532xx)  K26.6(532x)  K27.0(533xx)  K27.2(533xx)  K27.6(533xx)  K28.0(534xx)  K28.2(534xx)  K28.6(534xx)  K29.0((535xx))  K29.8A(535xx) | Subarachnoid haemorrhage  Intracerebral haemorrhage  Other nontraumatic intracranial haemorrhage  Sequelae of subarachnoid haemorrhage  Sequelae of intracerebral haemorrhage  Sequelae of other nontraumatic intracranial haemorrhage  Haemothorax  Gastric ulcer  Gastric ulcer chronic or unspecified with haemorrhage  Duodenal ulcer : acute with haemorrhage  Duodenal ulcer : chronic or unspecified with haemorrhage  Peptic ulcer, site unspecified : chronic or unspecified with both haemorrhage and perforation  Gastrojejunal ulcer : acute with haemorrhage  Melaena  Haematemesis  Gastrointestinal haemorrhage, unspecified  Recurrent and persistent haematuria  Gangrene, not elsewhere classified  Unspecified haematuria  Epidural haemorrhage  Traumatic subdural haemorrhage  Traumatic subarachnoid haemorrhage  Gastric ulcer : acute with both haemorrhage and perforation  Gastric ulcer : chronic or unspecified with both haemorrhage and perforation  Duodenal ulcer : acute with haemorrhage  Duodenal ulcer : acute with both haemorrhage and perforation  Duodenal ulcer : chronic or unspecified with both haemorrhage and perforation  Peptic ulcer, site unspecified : acute with haemorrhage  Peptic ulcer, site unspecified : acute with both haemorrhage and perforation  Peptic ulcer, site unspecified : chronic or unspecified with both haemorrhage and perforation  Gastrojejunal ulcer : acute with haemorrhage  Gastrojejunal ulcer : acute with both haemorrhage and perforation  Gastrojejunal ulcer : chronic or unspecified with both haemorrhage and perforation  Acute haemorrhagic gastritis  Duodenitis |
| **Sorenson 2013** | (ICD10) | I60(430)  I62(432x)  S06.4(800x)  S06.5(800x)  S06.6(800x)  J94.2(511x)  R04(784x)  K25.0(531xx)  K25.2(531xx)  K25.4(531xx)  K26.0(532xx)  K26.2(532xx)  K26.4(532xx)  K27.0(533xx)  K27.2(533xx)  K28.0(534xx)  K28.2(534xx)  K92.0(578x)  K92.1(578x)  K92.2(578x)  R31(599xx) | Subarachnoid haemorrhage  Other nontraumatic intracranial haemorrhage  Epidural haemorrhage  Traumatic subdural haemorrhage  Traumatic subarachnoid haemorrhage  Haemothorax  Haemorrhage from respiratory passages  Gastric ulcer : acute with haemorrhage  Gastric ulcer : acute with both haemorrhage and perforation  Gastric ulcer : chronic or unspecified with haemorrhage  Duodenal ulcer : acute with haemorrhage  Duodenal ulcer : acute with both haemorrhage and perforation  Duodenal ulcer : chronic or unspecified with haemorrhage  Peptic ulcer, site unspecified : acute with haemorrhage  Peptic ulcer, site unspecified : acute with both haemorrhage and perforation  Gastrojejunal ulcer : acute with haemorrhage  Gastrojejunal ulcer : acute with both haemorrhage and perforation  Haematemesis  Melaena  Gastrointestinal haemorrhage, unspecified  Unspecified haematuria |
| **Smythe 2014** | (ICD9) | Not reported | Hemorrhage |
| **Vaughan 2014** | (ICD9) | Not reported | Any Bleeding  Gastrointestinal Hemorrhage  Intracranial Hemorrhage  Hemorrhagee Other Site |
| **Hernandez 2015** | (ICD9) | ICH 430 431 432 GI Bleed 530.7 531.0 531.2 531.4 531.6 532.0 532.2 532.4 532.6 533.0 533.2 533.4 533.6 534.0 534.2 534.4  534.6 569.3 535.01 535.11 535.21 535.31 535.41 535.51 535.61 535.71 537.83 537.84 562.02 562.03  562.12 562.13 569.85 578 | ICH Subarachnoid hemorrhage Intracerebral hemorrhage  Other and unspecified intracranial hemorrhage GI Bleed Gastroesophageal lacerationhemorrhage syndrome Acute gastric ulcer with hemorrhage  Acute gastric ulcer with hemorrhage and perforation Chronic or unspecified gastric ulcer with hemorrhage Chronic or unspecified gastric ulcer with hemorrhage and perforation Acute duodenal ulcer with hemorrhage Acute duodenal ulcer with hemorrhage and perforation Chronic or unspecified duodenal ulcer with hemorrhage Chronic or unspecified duodenal ulcer with hemorrhage and perforation Acute peptic ulcer of unspecified site with hemorrhage Acute peptic ulcer of unspecified site with hemorrhage and perforation Chronic or unspecified peptic ulcer of unspecified site with hemorrhage  Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation Acute gastrojejunal ulcer with hemorrhage Acute gastrojejunal ulcer with hemorrhage and perforation Chronic or unspecified gastrojejunal ulcer with hemorrhage Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation Hemorrhage of rectum and anus  Acute gastritis, with hemorrhage Atrophic gastritis, with hemorrhage Gastric mucosal hypertrophy, with hemorrhage Alcoholic gastritis, with hemorrhage Other specified gastritis, with hemorrhage Unspecified gastritis and gastroduodenitis, with hemorrhage Duodenitis, with hemorrhage Eosinophilic gastritis, with hemorrhage Angiodysplasia of stomach and duodenum with hemorrhage Dieulafoy lesion (hemorrhagic) of stomach and duodenum  Diverticulosis of small intestine with hemorrhage Diverticulitis of small intestine with hemorrhage Diverticulosis of colon with hemorrhage Diverticulitis of colon with hemorrhage Angiodysplasia of intestine with hemorrhage Gastrointestinal hemorrhage |

# Quality assessment of studies included in the analysis (Downs and Black checklist)

1. Is the hypothesis/aim/objective of the study clearly described? Y/N
2. Are the main outcomes to be measured clearly described in the Introduction or Methods section? Y/N
3. Are the characteristics of the patients included in the study clearly described ? Y/N
4. Are the interventions of interest clearly described? Y/N
5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?
6. Are the main findings of the study clearly described? Y/N
7. Does the study provide estimates of the random variability in the data for the main outcomes? Y/N
8. Have all important adverse events that may be a consequence of the intervention been reported? Y/N
9. Have the characteristics of patients lost to follow-up been described? Y/N
10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001? Y/N
11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited? Y/N/UTD
12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited? Y/N/UTD
13. Were the staff, places, and facilities where the patients were treated, representative of the treatment the majority of patients receive? Y/N/UTD
14. Was an attempt made to blind study subjects to the intervention they have received ? Y/N/UTD
15. Was an attempt made to blind those measuring the main outcomes of the intervention? Y/N/UTD
16. If any of the results of the study were based on “data dredging”, was this made clear? Y/N/UTD
17. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls ? Y/N/UTD
18. Were the statistical tests used to assess the main outcomes appropriate? Y/N/UTD
19. Was compliance with the intervention/s reliable? Y/N/UTD
20. Were the main outcome measures used accurate (valid and reliable)? Y/N/UTD
21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population? Y/N/UTD
22. Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time? Y/N/UTD
23. Were study subjects randomised to intervention groups? Y/N/UTD
24. Was the randomised intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable? Y/N/UTD
25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn? Y/N/UTD
26. Were losses of patients to follow-up taken into account? Y/N/UTD
27. Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%? Sample sizes have been calculated to detect a difference of x% and y%.

| **Reference** | **Full text/Abstract** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lauffenburger 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | N/A |
| Abraham 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Armbruster 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Brais 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Nelson 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Labaf 2014 | Full text | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 0 | N/A | N/A | 0 | 0 | N/A |
| LaLiberte 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Sorenson 2013 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Ho 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Providencia 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | N/A | N/A | 0 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Hernandez 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Larsen 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 0 | N/A | N/A | 1 | 0 | N/A |
| Vaughan 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 0 | N/A | N/A | 0 | 0 | N/A |
| Larsen 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 0 | N/A | N/A | 1 | 0 | N/A |
| Larsen 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 0 | N/A | N/A | 1 | 0 | N/A |
| Lakkireddy 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Kaiser 2013 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Larsen 2013 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | N/A | N/A | 0 | 0 | N/A |
| Ho 2012 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Graham 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Smythe 2014 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Bengtson 2014 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Avgil 2014 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Choi 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | N/A | N/A | 1 | 0 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Seeger 2013 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Avgil 2013 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Alonso 2013 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Zalesak 2013 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Bassiouny 2013 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Lakkireddy 2013 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Bergman 2013 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Kim 2013 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Thelus 2012 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Ellis 2012 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| CNAMTS + ANSM 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| ANSM + CNAMTS 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Avgil 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | 0 | 0 | 1 | 1 | 0 | N/A | N/A | 1 | 0 | N/A |
| Avgil 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | 1 | 0 | 1 | 1 | 0 | N/A | N/A | 1 | 0 | N/A |
| Coleman 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Di Biase 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Franco 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Lau 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Lin 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Lip 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Luger 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | N/A | N/A | 0 | 1 | 1 |  | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Maura 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Nagao 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | N/A |
| Nyman 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Pallisgaard 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Seeger 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  | 1 | 0 | 1 | N/A | N/A | 0 | 1 | 0 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Shiga 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 1 | N/A |
| Snipelisky 2014 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | N/A | N/A | 0 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Staerk 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Tziomalos 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Villines 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | N/A | N/A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Bouillon 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 1 |  | 0 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Yao 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Coleman 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Larsen 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | N/A | N/A | 1 | 0 | N/A |
| Nelson 2016 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Lamberts 2016 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Lip 2016 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Deitelzweig 2016 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Wong 2016 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Norby 2016 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Kodani 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Chan 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Kamble 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Amin 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Seeger 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Lip 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Charlton 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Alpesh 2015 | Abstract |  |  |  |  |  |  |  |  |  |  |  |  |  | N/A | N/A |  |  |  |  |  |  |  | N/A | N/A |  |  | N/A |
| Nishtala 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Chan 2015 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |
| Gorst-Rasmussen 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Chan 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | N/A | N/A | 1 | 1 | N/A |
| Korenstta 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Okumura 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Chan 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | N/A | N/A | 1 | 0 | N/A |
| Ellis 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Pallisgaad 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Yap 2016 | Full text | 1 | 1 | 1 | 1 |  | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 0 | 1 | N/A | N/A | 1 | 0 | N/A |
| Coleman 2016 | Full text | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Marler 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Yavuz, 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Beyer-Westendorf 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Naganuma 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | N/A | N/A | 0 | 0 | N/A |
| Li 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |  | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | N/A |
| Bengtson 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Halvorsen, 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |  | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | N/A | N/A | 1 | 0 | N/A |
| Johnson 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Staerk, 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Lip 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 0 | N/A |
| Lip 2016 | Full text | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 1 | 1 | 1 | 1 | 1 | 1 | 1 | N/A | N/A | 0 | 0 | N/A |

# Specific information on studies included in the analysis

| **Reference** | **Country** |  |  |  |
| --- | --- | --- | --- | --- |
| Lauffenburger 2015 | US | Claims analysis | • Dabigatran: 67.5 (12.4) • Warfarin: 71.4 (12.2) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Abraham 2015 | US | Claims analysis | Dabiatran vs. Warfarin: • Dabigatran: 67.2 (11.2) • Warfarin: 67.5 (11.2) Rivaroxaban vs. Warfarin: • Rivaroxaban: 69.0 (10.9) • Warfarin: 69.1 (10.9) | Adjusted on Safety/Baseline characteristics |
| Armbruster 2015 | US | Registry | • Warfarin: 63.9 (10.1) • Dabigatran: 60.8 (9.4) • Rivaroxaban: 60.3 (9) • Apixaban: 62.2 (12.2) | No adjustment |
| Brais 2015 | Canada | Chart review | • Dabigatran: 72.51 ± 14.84  • Warfarin: 80.03 ± 9.37 | No adjustment |
| Nelson 2014 | US | Claims analysis | • Rivaroxaban: 71.6 (11.8)  • Warfarin (PS matched): 71.6 (11.7) | Adjusted on Effectiveness/Baseline characteristics |
| Labaf 2014 | Sweden | Cohort and case-control | • Total NOACs: 70.5 (10.3) -Dabigatran 110mg: 77.2 (8.5) -Dabigatran 150mg: 66.0 (9.2) -Rivaroxaban 15mg: 81.9 (7.3) -Rivaroxaban 20mg: 71.1 (8.1) • Warfarin: 75.0 (9.6) | Adjusted on Baseline characteristics |
| LaLiberte 2014 | US | Claims analysis | • Rivaroxaban: 73.3 (8.4) • Warfarin: 73.7 (8.3) | Adjusted on Safety/Baseline characteristics |
| Sorenson 2013 | Denmark | Registry | • Dabigatran 110 mg: 67.9 (±8.15) • Dabigatran 150 mg: 79.6 (±8.3) • Warfarin 2.5 mg: 73.5 (±10.0) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Ho 2015 | China | Registry | • Dabigatran: 74.5 ± 9.5 • Warfarin (1R): 77.5 ± 8.8 • Warfarin (2Q): 76.7 ± 8.5 • Warfarin (3Q): 75.7 ± 8.5 • Warfarin (4Q): 74.8 ± 8.8 • Aspirin: 80.3±8.8 • No Aspirin or Warfarin: 80.6±9.4 | Adjusted on Baseline characteristics |
| Providencia 2014 | France | Cohort study | • VKA: 62.9 ± 8.3 • Rivaroxaban: 60.1 ± 9.9 • Dabigatran: 59.8 ± 9.8 | No adjustment |
| Hernandez 2015 | US | Cohort study | Before propensity score weighting • Dabigatran: 75.7 (8.5) • Warfarin: 75.0 (10.4) After propensity score weighting • Dabigatran: 75.1 (10.2) • Warfarin: 75.6 (9.5) | Adjusted on Effectiveness/Baseline characteristics |
| Larsen 2014 | Denmark | Registry | VKA-naïve, median: • Warfarin: 76 • Dabigatran 110 mg: 83 • Dabigatran 150 mg: 69 VKA-experienced, median: • Warfarin: 75 • Dabigatran 110 mg: 82 • Dabigatran 150 mg: 70 | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Vaughan 2014 | US | Cohort study | • Dabigatran: 69.7 (9.0) • Warfarin: 74.4 (10.1) | Adjusted on Effectiveness/Baseline characteristics |
| Larsen 2014 | Denmark | Registry | VKA-naïve, median (IQR): • Warfarin: 73 (66-80) • Dabigatran 110 mg: 82 (77-86) • Dabigatran 150 mg: 67 (62-72) VKA-experienced, %: • Warfarin: 74 (67-81) • Dabigatran 110 mg: 82 (77-86) • Dabigatran 150 mg: 69 (64-73) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Larsen 2014 | Denmark | Registry | VKA-naïve, median: • Warfarin: 72 • Dabigatran 110 mg: 82 • Dabigatran 150 mg: 68 VKA-experienced, median: • Warfarin: 75 • Dabigatran 110 mg: 82 • Dabigatran 150 mg: 69 | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Lakkireddy 2014 | US | Registry | • Rivaroxaban: 63 ±10 • Warfarin: 63 ±10 | No adjustment |
| Kaiser 2013 | US | Cohort study | • Dabigatran: 58±11 • Warfarin: 64±10 | No adjustment |
| Larsen 2013 | Denmark | Registry | • Dabigatran 110 mg: 74.7 (11.8) • Dabigatran 150 mg: 67.4 (8.5) • Warfarin: 70.4 (12.6) | Adjusted on Baseline characteristics |
| Ho 2012 | China | Chart review | • Dabigatran: 70.0 ± 11.4 • Warfarin: 70.1 ± 10.3 | Adjusted on Baseline characteristics |
| Graham 2015 | US | Claims analysis | • Dabigatran:  - 65–74: 42% - 75–84: 43% - ≥85: 16% • Warfarin: - 65–74: 41% - 75–84: 43% - ≥85: 16% | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Smythe 2014 | US | Chart review | Not reported | No adjustement |
| Bengtson 2014 | US | Claims analysis | Not reported | Adjusted on Baseline characteristics |
| Avgil 2014 | Canada | Database analysis | Not reported | Adjusted on Baseline characteristics |
| Choi 2014 | US | Cross-sectional | • Dabigatran: 69 (12) • Warfarin: 68 (9.12) | No adjustment |
| Seeger 2013 | US | Claims analysis | Prior to PS matching • Dabigatran: 62.4 ± 10.8 • Warfarin: 64.7 ± 11.5 After PS matching • Dabigatran: 63.9 ± 11.0 • Warfarin: 63.3 ± 11.0 | Adjusted on Effectiveness/Baseline characteristics |
| Avgil 2013 | Canada | Cohort study | Not reported | Adjusted on Effectiveness/Safety |
| Alonso 2013 | US | Claims analysis | Not reported | Adjusted on Effectiveness/Baseline characteristics |
| Zalesak 2013 | US | Claims analysis | • Dabigatran (before PS match): 73.0 (9.7) • Dabigatran (after PS match): 73.2 (9.7) • Warfarin (before PS match): 72.8 (10.8) • Warfarin (after PS match): 72.8 (10.8) | Adjusted on Safety/Baseline characteristics |
| Bassiouny 2013 | US | Cohort study | • Dabigatran 150mg (before PS match): 58.6 ± 11.0 • Warfarin uninterrupted (before PS match): 62.7 ± 9.6 • Dabigatran 150mg (after PS match): 60.0 ± 10.0 • Warfarin uninterrupted (after PS match): 60.1 ± 10.4 | Adjusted on Baseline characteristics |
| Lakkireddy 2013 | US | Registry | Mean age of the population was 62 +/-9 | Adjusted on Baseline characteristics |
| Bergman 2013 | Sweden | Chart review | • Dabigatran: 70.4 ± 10.0 • Warfarin: 75.0 ± 9.6 | No adjustment |
| Kim 2013 | US | Case-control | • Dabigatran 150mg: 61 ± 10 • Warfarin uninterrupted: 61 ± 10 | Adjusted on Safety/Baseline characteristics |
| Thelus 2012 | US | Claims analysis | • Dabigatran: 74 • Warfarin: 76 | Adjusted on Baseline characteristics |
| Ellis 2012 | US | Cohort study | Not reported | No adjustment |
| CNAMTS + ANSM 2014 | France | Databse analysis | • Dabigatran 150: 66.0±10  • Dabigatran: 73.3±12  • Rivaroxaban 10 or 15: 70.1±16 • Rivaroxaban 20: 67.0±13 • Rivaroxaban: 68.4±15 | Adjusted on Baseline characteristics |
| ANSM + CNAMTS 2014 | France | Databse analysis | • DOAC: 72.8 (11.5) • VKA: 72.9 (11.4) | No adjustment |
| Avgil 2015 | Canada | Database analysis | • Men: 76.3 (9.3)  • Women: 80.3 (8.8) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Avgil 2016 | Canada | Cohort study | 78.3 (9.3) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Coleman 2016 | Germany | Database analysis | • Rivaroxaban: 74.0 (10.7) • VKA: 74.4 (9.9) | Adjusted on Baseline characteristics |
| Di Biase 2015 | US, Europe | Registry | 65.9 (9.9) | Adjusted on Baseline characteristics |
| Franco 2015 | Italy | Cohort study | • Apixaban: 81 (5) • Dabigatran: 74 (5) • Rivaroxaban: 80 (6) • Warfarin: 77 (6) | No adjustment |
| Lau 2015 | China (Hong Kong) | Database analysis | Not reported | Unclear |
| Lin 2015 | US | Database analysis | Not reported | Adjusted on Safety/Baseline characteristics |
| Lip 2015 | US | Database analysis | • Apixaban: 69.3±12.3 • Dabigatran: 66.8±12.1 • Rivaroxaban: 67.3±12.2  • Warfarin: 72.5±11.9 | Adjusted on Baseline characteristics |
| Luger 2015 | Germany | Registry | • VKA: 77.4 (8.0) • Dabigatran: 74.2 (10.4) • Rivaroxaban: 78.2 (8.6) | Adjusted on Baseline characteristics |
| Maura 2015 | France | Database analysis | Dabigatran vs. VKA: • Dabigatran: 74.0 (11.3) • VKA: 73.9 (11.2) Rivaroxaban vs. VKA: • Rivaroxaban: 73.6 (11.4) • VKA: 73.4 (11.2) | Adjusted on Safety/Baseline characteristics |
| Nagao 2015 | Japan | Cohort study | Before PSM • Apixaban: 61 ± 13 • Warfarin: 62 ± 9 After PSM • Apixaban: 61 ± 13 • Warfarin: 61 ± 13 | No adjustment |
| Nyman 2015 | Sweden | Cohort study | Not reported | Not reported |
| Pallisgaard 2015 | Denmark | Cohort study | Median (IQR) • Dabigatran: 66.3 (59.3–72.6) • Warfarin: 67.4 (60.8–72.5) | Adjusted on Baseline characteristics |
| Seeger 2015 | US | Database analysis | MarketScan (PS matched cohort) • Dabigatran: 68.73 (12.0) • Warfarin: 68.33 (12.2) Clinformatics (PS matched cohort) • Dabigatran: 63.36 (10.86) • Warfarin: 63.05 (10.86) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Shiga 2015 | Japan | Cohort study | • Apixaban: 70 ± 10 • Dabigatran: 70 ± 9 • Rivaroxban: 70 ± 10 • Warfarin: 68 ± 13 | No adjustment |
| Snipelisky 2014 | US | Chart review | • Warfarin: 66.5 • Dabigatran: 65.3  • Rivaroxaban: 68.4 | No adjustment |
| Staerk 2015 | Denmark | Registry | • OAC-naive warfarin: 70.3 ±11.3 • OAC-naive dabigatran 110: 80.0 ± 8.7 • OAC-naive dabigatran 150: 65.9 ± 8.7 • OAC-experienced dabigatran 110: 79.6 ± 8.1 • OAC-experienced dabigatran 150: 67.7 ± 8.5 | Adjusted on Effectiveness/Baseline characteristics |
| Tziomalos 2015 | Greece | Cohort study | 78.5±6.3 | Not reported |
| Villines 2015 | US | Cohort study | After PSM • Dabigatran: 73.8 ± 9.3 • Warfarin: 74.0 ± 9.0 | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Bouillon 2015 | France | Database analysis | • NOAC: 75 (67–82) • VKA: 75 (67–82) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Yao 2016 | US | Claims analysis | Median (IQR) Apixaban vs warfarin • Apixaban: 73 (66–81) • Warfarin: 73 (66–81) Dabigatran vs warfarin  • Dabigatran: 70 (62–78) • Warfarin: 70 (61–78 Rivaroxaban vs warfarin • Rivaroxaban: 72 (64–79) • Warfarin: 72 (64–80) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Coleman 2016 | US | Cohort study | • Rivaroxaban: 71.3 (11.1)  • Dabigatran: 70.9 (10.8)  • Warfarin: 71.5 (11.3) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Larsen 2016 | Denmark | Cohort study | Median (interquartile range) age (years) • Apixaban: 71.3 (65.8-77.2) • Dabigatran: 67.6 (62.0-72.4) • Rivaroxaban: 71.8 (65.7-78.9) • Warfarin: 72.4 (64.7-79.8) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Nelson 2016 | US | Cohort study (using Optum's Integrated Claims-Clinical dataset) | 73 | Adjusted on Safety/Baseline characteristics |
| Lamberts 2016 | Denmark | Cohort study | 73 (IQR = [66 ; 81]) | Adjusted on Effectiveness/Safety/NR for Basline |
| Lip 2016 | US | Cohort study | Not reported | Adjusted on Baseline characteristics |
| Deitelzweig 2016 | US | Cohort study | • apixaban 69.7  • warfarin 71.2 | Not reported |
| Wong 2016 | US | Database analysis | Not reported | Adjusted on Baseline characteristics |
| Norby 2016 | US | Database analysis | Mean: 71 | Adjusted on Effectiveness/Baseline characteristics |
| Kodani 2016 | Japan | Registry | • Overall: 69.7 (9.9) • No-OAC: 68.3±12.0  • Warfarin: 70.1±9.4  • Xaban/DTI: 67.1±8.3 | Adjusted on Effectiveness |
| Chan 2016 | Taiwan | Cohort study | Before Propensity-Score Weighting • Dabigatran: 75 (10) • Warfarin: 71 (12) After Propensity-Score Weighting • Dabigatran: 76 (10) • Warfarin: 75 (10) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Kamble 2015 | US | Cohort study | Range between 65,2±11,4 and 72,5±11,9 | Adjusted on Baseline characteristics |
| Amin 2015 | US | Cohort study | Not reported | Adjusted on Effectiveness/Baseline characteristics |
| Seeger 2015 | US | Cohort study | Not reported | Not reported |
| Lip 2015 | US | Cohort study | Not reported | Adjusted on Baseline characteristics |
| Charlton 2015 | US | Cohort study | • Warfarin: 74 • Rivaroxaban: 68 • Dabigatran: 69 | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Alpesh 2015 | US | Database analysis | Not reported | Not reported |
| Nishtala 2016 | New Zealand | Cohort study | After PSM:  • Dabigatran: 77.30 (6.4)  • Warfarin: 77.40 (6.6) | Adjusted on Baseline characteristics |
| Chan 2015 | China | Cohort study | • Total: 84.8 (4.0) • Dabigatran : 83.6 (3.2) • Warfarin : 85.1 (4.1) | Adjusted on Effectiveness/Baseline characteristics |
| Gorst-Rasmussen 2016 | Denmark | Cohort study | • Rivaroxaban 15 mg: 82.8 (8.7) • Rivaroxaban 20 mg: 72.8 (9.9) • Dabigatran 110 mg: 80.8 (8.0) • Dabigatran 150 mg: 66.0 (8.5) • Warfarin: 72.6 (11.3) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Chan 2016 | China | Cohort study | • Total: 72.7 (12.2) • Dabigatran : 71.9 (11.1) • Warfarin : 72.9 (12.5) | No adjustment |
| Korenstta 2016 | The Netherlands | Cohort study | • Dabigatran: 70.6 (8.9) • Acenocoumarol:72.3 (9.3) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Okumura 2016 | Japan | Cohort study | • Rivaroxaban: 63.0 (10.4) • Warfarin: 67.7 (9.9) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Chan 2016 | Taiwan | Cohort study | Before PSM: • Rivaroxaban: 76 (9) • Dabigatran: 75 (9) • Warfain: 71 (12)  After PSM: • Rivaroxaban: 76 (9) • Dabigatran: 75 (9) • Warfain: 76 (8) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Ellis 2016 | Israel | Cohort study | Median (range): • Warfarin: 79 (27–99) • Dabigatran150: 78 (52–89) • Dabigatran110 : 82 (55–95) • Rivaroxaban: 82 (58–91) | Adjusted on Effectiveness/Baseline characteristics |
| Pallisgaad 2016 | Denmark | Cohort study | (median [IQR]) • VKA: 62.9 [55.1, 68.8] • Dabigatran: 65.1 [58.0, 70.0] | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Yap 2016 | Malaysia | Cohort study | Mean age (range): • Dabigatran: 65.3 (11.3) • Warfarin: 66.8 (11.3) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Coleman 2016 | US | Claims analysis | After PSM: • Rivaroxaban: 70.66 (10.99) • Warfarin: 70.72 (11.35) • Apixaban: 71.00 (11.25) • Warfarin: 71.15 (11.32) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Marler 2016 | US | Chart review | • Dabigatran + Rivaroxaban + Warfarin 70.1 (12.6) • Warfarin 68.3 (14.6) | No adjustment |
| Yavuz, 2016 | Turkey | Registry | •Dabigatran 110 mg 75.2 ± 8.7 •Dabigatran 150 mg 66.2 ± 9.1 •Warfarin 68.4 ± 11.9 | Adjusted on Effectiveness/Baseline characteristics |
| Beyer-Westendorf 2016 | Germany | Database analysis | With 180 days follow-up •Dabigatran 73.9 (10.1) •Rivaroxaban 74.8 (10.4) •VKA 74.7 (9.8) With 360 days follow-up •Dabigatran 74.0 (9.8) •Rivaroxaban 74.3 (10.0) •VKA 74.6 (9.7) | No adjustment |
| Naganuma 2016 | Japan | Cohort study | Median [range] • Dabigatran (CrCl (mL/min) ＜50): 80 [66-93] • Dabigatran (CrCl (mL/min) ≥50): 69 [31-91] • Rivaroxaban (CrCl (mL/min) ＜50): 78 [69-89] • Rivaroxaban (CrCl (mL/min) ≥50): 70 [36-84] • Apixaban (CrCl (mL/min) ＜50): 79 [57-91] • Apixaban (CrCl (mL/min) ≥50): 70 [40-90] • Warfarin (CrCl (mL/min) ＜50): 78 [53-94] • Warfarin (CrCl (mL/min) ≥50): 67 [27-90] | Not clear |
| Li 2016 | China | Cohort study | • Warfarin TTR <65%: 73.9 ± 13.2 (SD) • Warfarin TTR ≥65%: 71.1 ± 11.7 (SD) • Rivaroxaban: 73.3 ± 12.1 (SD) • Dabigatran: 71.9 ± 11.1 (SD) | Adjusted on Baseline characteristics |
| Bengtson 2016 | US | Cohort study | New Users: Dabigatran: 68.5 ( 12.3) Warfarin: 70.8 (12.1) Switchers: Dabigatran: 70.9 (11.3) Warfarin: 71.5 (11.4) Pooled: Dabigatran: 70.4 (12.0) Warfarin: 72.5 (12.2) | Adjusted on Effectiveness/Baseline characteristics |
| Halvorsen, 2016 | Norway | Cohort study | • Dabigatran: Mean (SE) 70.8 (11.3) • Rivaroxaban: Mean (SE) 74.7 (10.7) • Apixaban: Mean (SE) 74.5 (11.1) • Warfarin: Mean (SE) 74.6 (11.9) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Johnson 2016 | UK | Cohort study | OAC naïve patients, median (IQR) • Apixaban:75.0 (68.0–83.0) • Rivaroxaban: 77.0 (70.0–83.0) • Dabigatran: 74.0 (66.0–81.0) • VKA: 75.0 (68.0–82.0) OAC experienced patients, median (IQR) • Apixaban: 77.0 (69.0–83.0) • Rivaroxaban: 78.0 (70.0–84.0) • Dabigatran: 76.0 (68.0–82.0) • VKA: 75.0 (68.0–80.0) | Adjusted on Baseline characteristics |
| Staerk, 2016 | Denmark | Cohort study | Median (IQR) • VKA 73 (65–80) • Dabigatran 71 (65–80) • Rivaroxaban 74 (67–83) • Apixaban 76 (68–84) | Adjusted on Effectiveness/Safety/Baseline characteristics |
| Lip 2016 | US | Cohort study | • Apixaban Mean, SD: 69.34, 12.33 • Dabigatran 66.83, 12.17 • Rivaroxaban 67.33, 12.25 • Warfarin 72.53, 11.88 | Adjusted on Baseline characteristics |
| Lip 2016 | US | Cohort study | • Apixaban: 69.1 (12.3) • Dabigatran: 66.9 (12.2) • Rivaroxaban: 69.7 (11.9) • Warfarin:   PSM Warfarin vs Apixaban: 69 (12.3)  PSM Warfarin vs Dabigatran: 67.5 (12.3)  PSM Warfarin vs Rivaroxaban: 70.1 (12) | Adjusted on Baseline characteristics |

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